



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/881,702	09/14/2010	Kyoung-Han YEW	P59156	1562

8439 7590 02/02/2017
ROBERT E. BUSHNELL & LAW FIRM
2029 K STREET NW
SUITE 600
WASHINGTON, DC 20006-1004

EXAMINER

ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
----------	--------------

1727

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

02/02/2017

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

rebushnell@aol.com
mail@rebushnell.com
info@rebushnell.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte KYOUNG-HAN YEW, SANG-MIN LEE,
YOUNG-HWAN KIM, and DUCK-CHUL HWANG

Appeal 2015-007612
Application 12/881,702¹
Technology Center 1700

Before JAMES C. HOUSEL, CHRISTOPHER L. OGDEN, and
MICHAEL G. MCMANUS, *Administrative Patent Judges*.

OGDEN, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's
decision² finally rejecting claims 1–18 in the above-identified application.

We have jurisdiction pursuant to 35 U.S.C. § 6(b).

We AFFIRM.

¹ Appellants identify Samsung SDI Co., Ltd. as the real party in interest.
Appeal Br. 3, Mar. 25, 2015.

² Office Action, Oct. 24, 2014 [hereinafter Action]; Examiner's Answer, June
17, 2015 [hereinafter Answer].

BACKGROUND

Appellants' invention relates to "a negative electrode for a rechargeable lithium battery." Spec. ¶ 2. Independent claim 1 is representative:

1. A negative electrode for a rechargeable lithium battery, comprising:
 - a current collector;
 - a negative active material composition layer disposed on the surface of the current collector including a negative active material; and
 - an inorganic salt layer disposed as a separate layer on the surface of the negative active material composition layer including an inorganic salt,*
 - wherein the negative active material comprises *a core including silicon and a carbon layer disposed on the surface of the core,* and
 - the inorganic salt comprises an alkaline metal cation selected from a Na cation, a K cation, or a combination thereof and an anion selected from a carbonate anion, a halogen anion, or a combination thereof.

Appeal Br. 17 (emphasis added). Claim 10 is also independent, and contains similar limitations including "an inorganic salt layer disposed as a separate layer on the surface of the negative active material composition layer," and "a core including silicon and a carbon layer disposed on the surface of the core." *Id.* at 18.

The Examiner maintains the following grounds of rejection:

1. Claims 1–18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yokouchi³ in view of either Wakita⁴ or Oishi.⁵ *See* Action 3–8.

2. Claims 3 and 13 are alternatively rejected under 35 U.S.C. § 103(a) as being unpatentable over Yokouchi in view of Wakita or Oishi, in further view of the admitted prior art (hereinafter AAPA) in paragraphs 3–6 of the Specification. *See* Action 8.

In the Appeal Brief, Appellants address claim 1 in their main arguments, *see* Appeal Br. 6–13, and present a separate argument jointly for claims 3 and 13, *see id.* at 14. Appellants present no additional substantive arguments for the remaining claims. *See id.* at 13–15. Therefore, consistent with 37 C.F.R. § 41.37(c)(1)(iv) (2016), we limit our discussion to claims 1 and 3, and claims 2 and 4–18 stand or fall with claim 1.

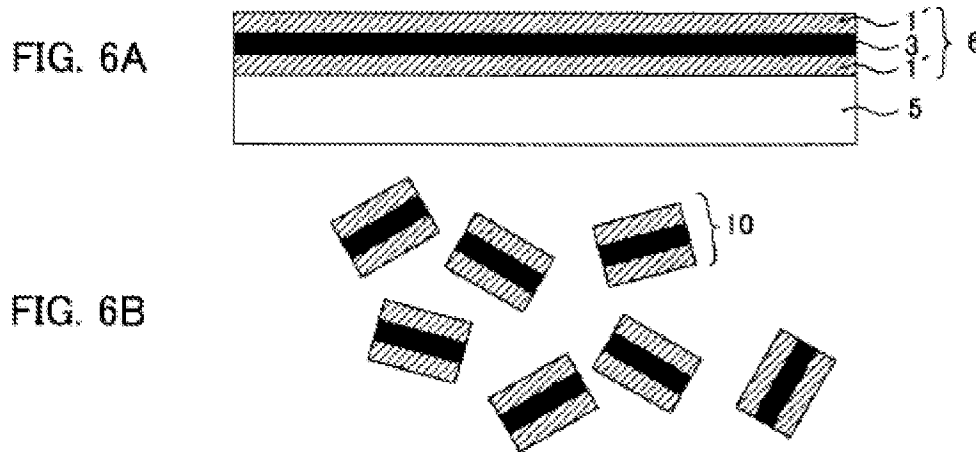
³ Yokouchi, Int’l Patent Pub. No. WO 2008/029888 (published Mar. 13, 2008). The Examiner cites to its English-language equivalent Patent Application Pub. No. US 2009/0274960 A1 (published Nov. 5, 2009).

⁴ Wakita, Patent Application Pub. No. JP 2009-016245 (published Jan. 22, 2009) (English machine translation provided by the Examiner)

⁵ Oishi, Patent Application Pub. No. JP 11-144718 A (published May 28, 1999) (translation provided by the Examiner).

DISCUSSION

Figures 6A and 6B of Yokouchi are reproduced below:



Figures 6A and 6B depict a method of manufacturing an anode active material **10**. In this embodiment, a carbon layer **3** is sandwiched between two metallic films **1'** to form a metal-carbon laminate **6** on a substrate **5**. Yokouchi ¶ 100. Yokouchi also teaches that “[t]he order in which formation of a metallic film and formation of a carbon coat are conducted in this embodiment is not limited,” and may include a two-layer structure in which a carbon layer is on the top, or a three-layer structure in which the metallic layer is sandwiched between two carbon layers. *See id.* ¶ 103. The laminate **6** can be peeled off the substrate **5** and pulverized to make particles **10**. *See id.* ¶ 100.

The Examiner finds that Yokouchi teaches a negative electrode according to the limitations of claim 1, except that it “does not expressly disclose the specific inorganic salt layer disposed on the negative active material layer.” Action 5–6. However, the Examiner finds that Wakita and/or Oishi teaches coating the surface of a negative active material composition layer with an inorganic salt. *See id.* at 6–7.

In particular, the Examiner finds that Wakita “discloses that the alkaline metal salt layer on the negative active material provides a battery capable of improving cycle characteristics with enhanced input/output characteristics; improves intercalation/deintercalation of lithium ions at charging and discharging; and enhances chemical stability of the anode active material.” *Id.* at 6 (citing Wakita Abstract, ¶¶ 126–133). The Examiner also finds that Oishi “teaches that it is known in the art to form a layer/film of a metal salt on the surface of an anode active material wherein the metal salt can be either NaCl or KCl.” *Id.* (citing Oishi Abstract, ¶¶ 5–8). Therefore, the Examiner concludes that “it would have been obvious to a skilled artisan at the time the invention was made to dispose, form or deposit the specific inorganic salt layer of [Wakita and/or Oishi on] the surface of the negative active material layer of Yokouchi.” *Id.*

Appellants argue that Wakita only teaches depositing an inorganic salt on the particles used to form the negative active material composition layer, and not on the layer itself. *See* Appeal Br. 8. According to Appellants, the Examiner merely asserts “the benefits of Wakita et al.’s invention,” but “does not explain why one of ordinary skill[] in the art would take a salt layer that is disposed on individual anode active material particles and place it as a separate layer on the surface of a negative active material composition layer.” Appeal Br. 12. This argument does not persuade us that the Examiner erred in rejecting claim 1, because Appellants do not point to evidence disputing the Examiner’s determination, *see* Answer 9–10, that even if the particles of Wakita are coated individually before formation into a negative active material composition layer, the layer itself is still coated with a layer of salt according to the limitations of claim 1, because some of

the particles will form the outer surface of the aggregate layer. We interpret claim terms according to “the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art,” and as informed by the Specification. *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). By its ordinary meaning, claim 1 does not require either (1) that the entire surface of the negative active material composition be coated with a single contiguous salt layer, or (2) that *only* the surface, and not also the surfaces of particles within the aggregate structure, be coated with a salt layer.

Without citing to factual evidence on this record, Appellants also argue that if the metal salt layer is deposited directly on the particles themselves, rather than on the layer as a whole, the metal salt “will be separated from the negative active material due to the volume expansion of the material,” and that because of the uneven surface of the carbon-coated particles, “one of ordinary skill in the art would recognize it would be very difficult to uniformly coat salts onto the individual negative active material particles that are presently claimed.” Appeal Br. 11; *see also* Reply Br. 4. Because this argument does not cite evidentiary support, we do not find it persuasive of reversible error. *See In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974) (“Attorney’s argument in a brief cannot take the place of evidence.”)

Moreover, Oishi teaches that salt may be laminated over a base consisting of a negative electrode active material. *See* Oishi ¶¶ 5–6. Thus, Oishi teaches an alternative method to that of Wakita for applying salt to a negative active material that does not require the coating of individual particles. *See* Action 6 (“[Oisha] teaches that it is known in the art to form a

layer/film of a metal salt on the surface of an anode active material wherein the metal salt can be NaCl or KCl.”).⁶ Appellants argue that Oishi is not an analogous reference because it relates to a very different battery chemistry for non-rechargeable, lithium-thionyl chloride cells, and the salt was applied to solve a problem specific to that chemistry. *See* Reply Br. 2–3. However, Oishi is a reference in the field of forming battery electrodes, and Oishi is “reasonably pertinent to the particular problem with which the inventor is involved,” that of applying an inorganic salt layer to a negative active material composition layer. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004).

Appellants also argue that the two or three-layer particle structures in Yokouchi do not constitute “a silicon core with a carbon layer disposed on the surface of the core as presently claimed.” Appeal Br. 8. We find this unpersuasive, because Yokouchi clearly teaches an embodiment in which a silicon layer is sandwiched on both sides by carbon layers. *See* Yokouchi ¶ 103. According to the broadest reasonable interpretation of claim 1, the silicon core is not required to be entirely enveloped by a carbon layer, so long as a carbon layer is disposed on at least a portion of the surface of the core.

Appellants also argue that the Specification demonstrates that claim 1 unexpectedly results in “superior initial efficiency, stable high temperature performance and improved cycle life.” Appeal Br. 13; *see also* Spec. Tbls.

⁶ Because we affirm the Examiner’s rejection based on either the combination of Yokouchi and Wakita or the combination of Yakouchi, Wakita, and Oishi, we need not address Appellants’ arguments regarding the Examiner’s alternative basis of rejection based solely on the combination of Yokouchi and Oishi.

1–3. However, the preponderance of the evidence does not support a finding that these results are unexpected. To show unexpected results, Appellants must establish “(1) that there actually is a difference between the results obtained through the claimed invention and those of the prior art, . . . and (2) that the difference actually obtained would not have been expected by one skilled in the art at the time of invention.” *In re Freeman*, 474 F.2d 1318, 1324 (CCPA 1973) (citation omitted). While Tables 1–3 of the Specification show differences between using example salts within the scope of claim 1 and using either no salt or two lithium salts, Appellants do not direct our attention to evidence that a person of ordinary skill in the art would not have expected these results. Moreover, Examples 1–6 appear to represent negative electrodes formed by the same method, except for the use of a different salt. *See* Spec. 73–88. Thus, the evidence does not address the effect on these results of other variables within the full scope of claim 1, such as variations in particle composition and size, and the amount of inorganic salt used. *See* Appeal Br. 17–20 (dependent claims cover variations in core composition, carbon type and amount, layer and particle size, etc.). Evidence of unexpected results must be commensurate in scope with the claims. *See In re Peterson*, 315 F.3d 1325, 1330–31 (Fed. Cir. 2003).

Claim 3 requires that “the carbon layer comprises an amorphous carbon.” The Examiner finds that “Yokouchi discloses that it is known to use an amorphous carbon.” Action 5 (citing Yokouchi ¶¶ 77, 134). Alternatively, the Examiner finds that “the AAPA discloses that it is known in the battery art to use carbon-based materials such as a hard carbon (an example of amorphous carbon) in the negative active electrode to enhance

conductivity and discharge potential.” *Id.* at 8. Thus, the Examiner concludes that

it would have been obvious to a skilled artisan at the time the invention was made to use the specific amorphous carbon material (i.e. hard carbon) of the AAPA as the amorphous carbon material in the negative electrode of Yokouchi, [Wakita] and/or [Oishi], as instantly combined, because the AAPA teaches that it is commonplace to use carbon based materials such as a hard carbon (an example of amorphous carbon) in the negative active electrode to enhance conductivity and discharge potential.

Id.

In response to the Examiner’s determination based on the AAPA, Appellants argue that

[t]he mere mention of an amorphous carbon as a stand-alone negative active material in paragraph [0005] of the background of the invention of the specification, does not establish that the invention of claim 3, which includes a negative active material comprising a core including silicon and an amorphous carbon layer disposed on the surface of the core, used in conjunction with an inorganic salt layer disposed on the surface of a negative active material composition layer is obvious over the prior art.

Appeal Br. 14. We do not find this argument persuasive of reversible error, because it does not address the Examiner’s finding that Yokouchi teaches amorphous carbon, and it mischaracterizes the Examiner’s findings regarding the AAPA, which include a rationale for combining the AAPA with the teachings of Yokouchi and Wakita.

For the above reasons, we are not persuaded that the Examiner reversibly erred in rejecting claims 1 and 3. Likewise, we are not persuaded of reversible error in the Examiner’s rejection of claims 2 and 4–18.

Appeal 2015-007612
Application 12/881,702

DECISION

The Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended. *See* 37 C.F.R. § 1.136(a)(1)(iv) (2016).

AFFIRMED